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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/715,651	11/17/2000	Harold Alexis Huggins	Huggins 6 (58638)	8052

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EXAMINER

VINH, LAN

ART UNIT	PAPER NUMBER
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1765

DATE MAILED: 07/23/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

# Office Action Summary

Application No.

09/715,651

Applicant(s)

HUGGINS, HAROLD ALEXIS

Examiner

Lan Vinh

Art Unit

1765

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

## Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on 10 June 2002.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 1-35 is/are pending in the application.
- 4a) Of the above claim(s) 29-35 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-28 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.  
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

## Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) ☐ All b) ☐ Some \* c) ☐ None of:  
1. ☐ Certified copies of the priority documents have been received.  
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).  
\* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).  
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

## Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_\_
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 2. 6) ☐ Other: \_\_\_\_\_

## **DETAILED ACTION**

### ***Election/Restrictions***

1. Applicant's election without traverse of Group I, claims 1-28 in Paper No. 7 is acknowledged.

### ***Specification***

2. In line 8 on page 6 of the specification, the term " may the be" appears to be a typographical error. The examiner suggests replacing the term " may the be" with –may be-

### ***Claim Rejections - 35 USC § 103***

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 1-6, 11-18, 22-24, 28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Krishaswamy et al (US 5,853,601 ) in view of Nakaki et al (US 5,998,861 )

Krishaswamy discloses a method for forming dielectric membranes for thin film devices such as film bulk acoustic resonator/RF component. This method comprises the steps of:

forming a dielectric layer 103 on a semiconductor substrate 101 ( col 5, lines 32-34)

forming a patterned electrode/conductive layer layer 109 on the dielectric layer 103 to form a film bulk acoustic resonator (FBAR) ( col 5, lines 35-36 ; fig. 5B ) reads on forming an d patterning a conductive layer on the dielectric layer to define the RF component

forming a plurality of vias/openings 113 ( all openings 113 stops/terminates at the substrate ) through the FBAR component and the dielectric layer to the substrate ( col 5, lines 51-53 ),

exposing the semiconductor substrate to a dry fluorine etchant to form an air gap beneath the FBAR component which remove the FBAR component from the substrate ( col 6, lines 5, lines 59-63; col 6, lines 15-17 and fig. 5F ) reads on removing/releasing the RF component from the substrate by exposing the substrate to an etchant.

Unlike the instant claimed inventions as per claims 1, 3, 14, 23, Krishaswamy does not specifically discloses that the etchant/ $\text{XeF}_2$  gas is passed through the opening/openings to the substrate.

However, Nakaki discloses a method for forming a sensor component on a semiconductor substrate comprises the step of passing  $\text{XeF}_2$  gas through substrate-removing holes/openings 2 to remove sensing element 3 from the substrate ( col 4, lines 10-12; col 4, lines 65-66 )

Since both Krishaswamy and Nataki are concerned with exposing the semiconductor structure having opening to fluorine etchant to remove/release the component from the substrate, one skilled in the art would have found it obvious to modify Krishaswamy's step of exposing the semiconductor substrate to a dry fluorine

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etchant by passing  $\text{XeF}_2$  gas through substrate-removing holes/openings as per Nataki because according to Nataki as a result of the substrate removal by the dry process using  $\text{XeF}_2$  gas, the substrate below the sensing-element/component is completely removed and it is possible to obtain a desired structure (col 6, lines 12-16 )

The limitations of claims 2-3, 15-16 have been discussed above.

Regarding claims 4-5, 17, Krishaswamy discloses forming a plurality of vias/openings 113 adjacent to the conductive layer, the openings do not extend through the conductive layer 109 (fig. 5F)

Regarding claims 6, 18, 24, fig. 5F of Krishaswamy shows uniform spacing between the openings 113.

Regarding claims 11, 22, 28, Krishaswamy discloses that the substrate is silicon ( col 5, lines 34-35 )

Regarding claims 12, 13, fig. 5F of Krishaswamy shows that the openings 113 extend and terminate at the substrate 101.

5. Claims 7, 10, 19, 25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Krishaswamy et al (US 5,853,601 ) in view of Nakaki et al (US 5,998,861 ) and further in view of Chong et al (US 6,093,330 )

Krishaswamy as modified by Nakaki has been described above in paragraph 4. Unlike the instant claimed inventions as per claims 7, 10, 19, 25, Krishaswamy and Nakaki do not disclose the specific spacing range between the opening and the diameter of the openings.

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However, Chong, in a process for making microstructures, discloses that the diameter and spacing of the subsurface structure (opening ) can be varied and controlled by the parameters of the etching process (col 4, lines 41-51 )

Hence, one skilled in the art would have found it obvious to modify Krishaswamy and Nakaki by adjusting/varying the etching parameters to vary the diameter and spacing in view of Chong using routine experimentation to produce any desired range for the spacing and diameter of the opening.

6. Claims 8, 20, 26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Krishaswamy et al (US 5,853,601 ) in view of Nakaki et al (US 5,998,861 ) and further in view of Dydyk et al (US 6,131,256 )

Krishaswamy as modified by Nakaki has been described above in paragraph 4. Unlike the instant claimed inventions as per claims 8, 20, 26, Krishaswamy and Nakaki do not disclose forming the electrode/conductive layer comprises of aluminum.

However, Dydyk discloses forming a resonator/RF component having an electrode layer of aluminum ( col 2, lines 16-18)

Since Krishaswamy is directed to a method of forming a resonator, one skilled in the art would have found it obvious to modify Krishaswamy and Nakaki by forming the electrode/conductive layer comprises of aluminum as per Dydyk because using low acoustic loss material (Al) has less of an impact on the Q ( quality factor of material ) of the resonator structure ( col 2, lines 17-20 )

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7. Claims 9, 21, 27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Krishaswamy et al (US 5,853,601 ) in view of Nakaki et al (US 5,998,861 ) and further in view of Dydyk et al (US 5,424,698 )

Krishaswamy as modified by Nakaki has been described above in paragraph 4.

Krishaswamy and Nakaki differ from the instant claimed inventions as per claims 9, 21, 27 by forming a dielectric layer of silicon oxide instead of silicon nitride.

However, Dydyk (698), in a method of forming a semiconductor resonator, discloses forming a dielectric layer of any convenient insulating material includes silicon oxide and silicon nitride ( col 4, lines 50-52 )

Hence, one skilled in the art would have found it obvious to modify Krishaswamy and Nakaki by using silicon nitride as a dielectric layer in view of Dydyk teaching because both silicon nitride and silicon oxide are convenient dielectric material, thus the substitution of one for the other would have been anticipated to produce an expected result.

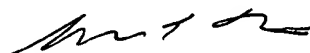
**Conclusion**

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Lan Vinh whose telephone number is 703 305-6302.

The examiner can normally be reached on M-F 8:30-5:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Benjamin Utech can be reached on 703 308-3836. The fax phone numbers for the organization where this application or proceeding is assigned are 703 872-9310 for regular communications and 703 872-9311 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703 308-0661.

  
BENJAMIN L. UTECH  
SUPERVISORY PATENT EXAMINER  
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LV  
July 16, 2002